

REMARKS

The Applicant thanks the Examiner for the careful consideration of this application. Claims 1-16, 19, 22, 24-29, and 31-33 are currently pending. By this Amendment, claims 1, 3-5, 8, 9, 12, 14, 16, 22, 25, and 31 as well as the specification and drawings, have been amended. Claim 30 has been cancelled, without prejudice. Based on the foregoing amendments and the following remarks, the Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Objections to the Drawings

The Office Action objected to the drawings under 37 C.F.R. § 1.84(p)(4) for containing informalities. The drawing objections will be addressed in turn, below.

First, the Office Action objected to FIG. 1 for using reference character 2a to designate both the actuator body and the O-ring. FIG. 1 has been amended to replace the instance of reference character 2a on the left-hand side of the drawing with reference character 4, which identifies the O-ring. In addition, the specification has been amended at paragraph [0021] to use reference character 2a to refer strictly to the actuator body.

The Office Action also objected to FIG. 1 for showing the membrane seat surface 25 as being flat, while the specification discloses that the membrane seat surface 25 is dome-shaped. The specification has been amended to clarify that the “membrane seat surface 25 can be flat, as shown in FIGS. 1 and 2, but is preferably dome-shaped, as shown in FIG. 4.”

The Office Action objected to FIG. 2 for using reference character 4 to point out the

membrane seating surface, while the specification describes reference character 4 as the O-ring. FIG. 2 has been amended so that reference character 4 points out the O-ring, consistent with the specification. In addition, reference character 25 has been added to point out the membrane seat surface.

The Office Action also objected to FIG. 2 for using reference character 9 to point to the idle chamber, while the specification describes reference character 9 as the pump chamber. The lead line extending from reference character 9 has been extended to the pump chamber, consistent with the specification.

In view of the foregoing, the Applicant requests that the objections to the drawings be withdrawn.

Claim Rejections under 35 U.S.C. § 112

The Office Action rejected claims 3, 4, 5, 8, 16, and 22 under 35 U.S.C. § 112, second paragraph, as being indefinite. With respect to claim 22, the Office Action stated that the claim language “located towards the perimeter of said dome” is indefinite. With respect to claims 3, 4, 8, and 16, the Office Action stated that the claim language “towards a perimeter region” is indefinite.

To facilitate prosecution, claims 3, 4, 5, 8, 16, and 22 have been amended for clarity. For example, claims 3 and 4 have been amended to recite that “said membrane seat surface defines a center and a perimeter, and the inlet is located in the center, and said outlet is located between the center and the perimeter.” Claims 5, 8, 16, and 22 have been amended in a similar matter.

The Applicant submits that the amendments to claims 3, 4, 5, 8, 16, and 22 overcome the rejection under 35 U.S.C. § 112, second paragraph.

Rejections under 35 U.S.C. § 102

The Office Action rejected claims 1-5, 11, 14-16, 24-28, and 30-33 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,984,258 to Knebel et al. (“Knebel”). Claims 1, 14, and 25 are independent claims. The subject matter of claim 30 has been incorporated into claims 1, 14, and 25. The Applicant traverses this rejection for at least the following reasons.

A. Claims 1 and 14

Knebel does not disclose “a bias pressure applicator adapted to pump a pressurized stream of said fluid into said pump chamber at a pressure sufficient to move the membrane from the undistorted form to the distorted form,” as recited by claim 1. Knebel also fails to disclose the similar recitation of claim 14.

The Office Action aligns the SMA element 22 of Knebel’s FIG. 6 with the claimed “membrane.” The Office Action also aligns the enclosed space underneath the SMA element 22 with the claimed “pump chamber.” Further, the Office Action asserts that “[s]ince valve element (20) is shown in its normally closed position . . . the fluid entering would have to bias it closed and therefore, it is under sufficient force from the bias applicator to . . . deform[] the diaphragm, and that “the weight of the fuel above element (20) is also biasing the element closed.” However, with reference to Knebel’s FIG. 6, the fluid referred to in the Office Action is not pumped into the space underneath the SMA element 22 (aligned with the claimed “pump

chamber”), but rather, flows through the space *above* the SMA element 22. More specifically, Knebel discloses in reference to FIG. 6 that fuel enters through flow path 34, travels across the top of the SMA element 22, and exits through the return path 38. (See Knebel at col. 6, ll. 13-17.) This flow of fuel is not into the alleged “pump chamber,” as claimed, but rather, is into the chamber on the opposite side of the SMA element 22 from the alleged “pump chamber.”

Furthermore, nowhere does Knebel disclose that fuel is pumped into the space underneath the SMA element 22 at a pressure sufficient to move the SMA element 22 from the undistorted form to the distorted form, as claimed. Rather, Knebel discloses that *cooling* is used to move the SMA element 22 to its deformed position. (See Knebel at col. 5, ll. 47-58.) Knebel also discloses that *resistance heating* is used to move the SMA element 22 to its undeformed position. (See Knebel at col. 4, ll. 16-24.) Thus, the disclosure of Knebel is limited to the use of heating and cooling of the SMA element 22 to move it between the undeformed and deformed positions. Knebel does not disclose that pressurized fluid is pumped into the space underneath the SMA element 22 (i.e., the alleged “pump chamber”) at a pressure sufficient to move the SMA element 22 from the undistorted form to the distorted form, nor would Knebel’s device require such pressurized fluid to operate, because heating and cooling are used to move the SMA element 22.

In view of the foregoing, Knebel does not disclose “a bias pressure applicator adapted to pump a pressurized stream of said fluid into said pump chamber at a pressure sufficient to move the membrane from the undistorted form to the distorted form,” as recited by claim 1. Knebel also fails to disclose the similar recitation of claim 14. Claims 2-5, 11, 15, 16, 24, 32, and 33

depend variously from claims 1 and 14, and are patentable over Knebel for at least the same reasons.

B. Claim 25

Knebel does not disclose “introducing a pressurized flow of said fluid into contact with said membrane at an inlet location at a pressure sufficient to move said membrane from an undistorted form to a distorted form,” as recited by claim 25. The Office Action asserts that Knebel discloses all of the elements of claim 25 at column 3, lines 44-58. However, column 3, lines 44-58 of Knebel do not disclose “introducing a pressurized flow of said fluid . . . at a pressure sufficient to move said membrane from an undistorted form to a distorted form,” as claimed. Rather, as demonstrated above, the disclosure of Knebel is limited to the use of heating and cooling of the SMA element 22 to move the SMA element 22 between the undeformed and deformed positions. Accordingly, Knebel does not disclose “introducing a pressurized flow of said fluid into contact with said membrane at an inlet location at a pressure sufficient to move said membrane from an undistorted form to a distorted form,” as recited by claim 25. Claims 26-28 depend from claim 25, and are patentable for at least the same reasons.

Rejections under 35 U.S.C. § 103

(1) The Office Action rejected claims 1, 6-8, 12-14, and 29 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 4,636,149 to Brown (“Brown”) in view of U.S. Patent No. 3,606,592 to Madurski et al. (“Madurski”), and further in view of Knebel. Claims 1 and 14 are the independent claims. The Applicant traverses this rejection for at least the following reasons.

No reasonable combination of Brown, Madurski, and Knebel discloses “a bias pressure applicator adapted to pump a pressurized stream of said fluid into said pump chamber at a pressure sufficient to move the membrane from the undistorted form to the distorted form,” as recited by claim 1, nor the similar recitation of claim 14. The Office Action aligns the diaphragm 40 of Brown’s FIG. 3 with the claimed “membrane,” and aligns the check valve 32 of Brown’s FIG. 3 with the claimed “bias pressure applicator.” However, the check valve 32 does not pump a pressurized stream of fluid into the chamber 25 at a pressure sufficient to move the diaphragm 40 from the undistorted form to the distorted form, as claimed. Rather, heating and cooling of the bimetallic element 58 associated with the diaphragm 40 are used to move the diaphragm 40 between open and closed positions. (See Brown at col. 6, ll. 1-23.) Furthermore, the check valve 32 (or the associated passageways) does not applying a pressurized fluid stream against the diaphragm 40. Just the opposite, the outward flexing of the diaphragm 40 -- caused by heating of the bimetallic element 58 -- causes fluid flow into the chamber 25 through the check valve 32. (See Brown at col. 6, ll. 1-8.) Madurski and Knebel do not provide the missing disclosure of Brown. Accordingly, no reasonable combination of Brown, Madurski, and Knebel discloses “a bias pressure applicator adapted to pump a pressurized stream of said fluid into said pump chamber at a pressure sufficient to move the membrane from the undistorted form to the distorted form,” as recited by claim 1, nor the similar recitation of claim 14. Claims 6-8, 12, 13, and 29 depend variously from claims 1 and 14, and are patentable for at least the same reasons.

(2) The Office Action rejected claims 6-8, 9, 10, 19, and 22 under 35 U.S.C. § 103(a) as being obvious over Brown in view of Madurski and Knebel, and further in view of U.S. Patent

No. 6,948,918 to Hansen ("Hansen"). Claims 6-8, 9, 10, 19, and 22 depend variously from claims 1 and 14. As demonstrated above, claims 1 and 14 are patentable over any reasonable combination of Brown, Madurski, and Knebel. Hansen does not remedy the deficiencies of Brown, Madurski, and Knebel. Accordingly, claims 1 and 14, as well as dependent claims 6-8, 9, 10, 19, and 22, are patentable over any reasonable combination of Brown, Madurski, Knebel, and Hansen.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant, therefore, respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

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Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

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